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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/819,688	03/29/2001	Eiji Natori	109120	3149

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OLIFF & BERRIDGE, PLC
P.O. BOX 19928
ALEXANDRIA, VA 22320

EXAMINER
HOGANS, DAVID L

ART UNIT	PAPER NUMBER
2813	

DATE MAILED: 07/13/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/819,688	NATORI, EIJI	
	Examiner	Art Unit	
	David L. Hogans	2813	

-- The MAILING DATE of this communication appears on the cover sh t with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *28 April 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-13 and 15-17* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-13 and 15-17* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *29 March 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *8-01-03 & 3-17-04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

This Office Action is in response to the Supplemental Amendment filed on April 28, 2004.

Status of Claims

Claims 1-13 and 15-17 are pending. Claims 14 and 18-33 have been cancelled.

Information Disclosure Statement

1. The information disclosure statements (IDS) submitted on August 1, 2003, and March 17, 2004, are in compliance with the provisions of 37 CFR 1.97, and accordingly, have been considered by the examiner.

Claim Rejections - 35 USC § 112

The Examiner withdrawals the 35 U.S.C. § 112, first paragraph, rejection of Claims 1-13 and 15-17.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1, 4-8, 11 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP402179880 to Koketsu et al. in view of JP04035033 to Adachi et al.

Claims 1 and 5

Koketsu et al. teaches forming ceramics on a substrate (10) by mixing a gasified fine particle of a raw material (1) with an active species (oxygen 9) having high kinetic energy; feeding the mixed fine particle (1) and active species (oxygen 9) to the substrate (10) so that the fine particles of the raw material are deposited on the substrate while being provided with kinetic energy from the active species; and providing energy to the fine particles of raw material by the active species, wherein the ceramic film is formed by misted CVD or LSMCD (2) (See Abstract and Constitution) The Examiner notes that the microwave source (6) provides energy to the gases 3, 5 and 9, thereby, making them active. Additionally, gas 9 also imparts its energy to the fine particle raw material gas/mist.

Koketsu et al. fails to explicitly teach increasing the migration energy of atoms in the ceramic film for crystallization of the ceramic.

However, Adachi et al., in the Abstract and Constitution, teaches wherein a ferroelectric film with good crystallinity and free of pin-hole defects is formed by reaction of a vapor source (1)(PbLaZrTi alloy) with an oxygen plasma (i.e. – active oxygen species). The Examiner notes the temperature used by Adachi (i.e. – 500 °C) is within the range discussed by Applicant in their specification at pages 5-6. Finally, the Examiner notes that when a plasma is struck within a closed environment, all other conditions being held constant, the energy introduced by the microwaves will inherently increase the migrational energy of atoms because the temperature will rise with the

input of energy (i.e. – Kinetic Energy = (3/2)RT; wherein R is the universal gas constant and T is the temperature).

It would have been obvious to one of ordinary skill in the art to modify Koketsu et al. by incorporating crystallization of a ceramic film by introducing a plasma to increase migrational energy, as taught by Adachi et al., to enhance the electrical properties of the ferroelectric film by increasing the crystallinity.

Claim 4

Incorporating all arguments of Claim 1 and noting that Koketsu et al. teaches electrically charging the fine particles (1). (See Abstract and Constitution) The Examiner notes that the fine particles are charged via friction from flowing through the process pipes (noting Applicant's specification page 6 lines 14-18).

Claim 6

Incorporating all arguments of Claim 1 and noting that Koketsu et al. teaches the active species (oxygen) is a radical or ion (9). (See Abstract and Constitution)

Claim 7

Incorporating all arguments of Claims 1 and 6 and noting that Koketsu et al. teaches the active species is radical or ion of the raw material species (1). (See

Abstract and Constitution) The Examiner notes that the fine particle raw material can act as the active species, as well, because it too is subjected to the microwave source.

Claim 8

Incorporating all arguments of Claims 1 and 6 and noting that Koketsu et al. teaches the active species is an ion of oxygen (9). (See Abstract and Constitution)

Claim 11

Incorporating all arguments of Claim 1 and noting that Koketsu et al. teaches wherein the active species is fed to the substrate in an accelerated state (6 and 9). (See Abstract and Constitution)

Claim 15

Incorporating all arguments of Claim 1 and noting that Koketsu et al. teaches wherein the ceramic film is a dielectric/ceramic oxide. (See Abstract and Constitution)

3. Claims 1, 4-11 and 15-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over 6,110,531 to Paz de Araujo et al. (hereinafter Paz et al.) in view of JP04035033 to Adachi et al.

Claims 1 and 5

Paz et al. teaches forming ceramics on a substrate (117) by mixing a gasified fine particle of a raw material (113A, B and C) with an active species (112A, B and C) having high kinetic energy; feeding the mixed fine particle and active species to the substrate so that the fine particles of the raw material are deposited on the substrate while being provided with kinetic energy from the active species; and providing energy to the fine particles of raw material by the active species, wherein the ceramic film is formed by misted CVD or LSMCD (200) (See column 5 lines 21-30 and lines 45-56, columns 8-10 lines 39-63, columns 13-14 lines 50-10 and Figures 3 and 4) The Examiner notes that the plasma source (137) and the UV source (135) provide energy to the gases 112A, B and C, thereby, making them active. Gases 112A, B and C then impart their energy to the fine particle raw material gases/mist.

Paz et al. fails to explicitly teach increasing the migration energy of atoms in the ceramic film for crystallization of the ceramic.

However, Adachi et al., in the Abstract and Constitution, teaches wherein a ferroelectric film with good crystallinity and free of pin-hole defects is formed by reaction of a vapor source (1)(PbLaZrTi alloy) with an oxygen plasma (i.e. – active oxygen species). The Examiner notes the temperature used by Adachi and by Paz et al. (i.e. – 300 to 500 °C) is within the range discussed by Applicant in their specification at pages 5-6. Finally, the Examiner notes that when a plasma is struck within a closed environment, all other conditions being held constant, the energy introduced by the

plasma or UV source will inherently increase the migrational energy of atoms because the temperature will rise with the input of energy (i.e. – Kinetic Energy = (3/2)RT; wherein R is the universal gas constant and T is the temperature).

It would have been obvious to one of ordinary skill in the art to modify Paz et al. by incorporating crystallization of a ceramic film by introducing a plasma to increase migrational energy, as taught by Adachi et al., to enhance the electrical properties of the ferroelectric film by increasing the crystallinity.

Claim 4

Incorporating all arguments of Claim 1 and noting that Paz et al. teaches electrically charging the fine particles (113A, B and C). (See column 5 lines 21-30 and lines 45-56, columns 8-10 lines 39-63, columns 13-14 lines 50-10 and Figures 3 and 4) The Examiner notes that the fine particles are charged via friction from flowing through the process pipes (noting Applicant's specification page 6 lines 14-18).

Claim 6

Incorporating all arguments of Claim 1 and noting that Paz et al. teaches the active species (112A, B and C) is a radical or ion (135 and 137). (See column 5 lines 21-30 and lines 45-56, columns 8-10 lines 39-63, columns 13-14 lines 50-10 and Figures 3 and 4)

Claim 7

Incorporating all arguments of Claims 1 and 6 and noting that Paz et al. teaches the active species is radical or ion of the raw material species (113A, B or C). (See column 5 lines 21-30 and lines 45-56, columns 8-10 lines 39-63, columns 13-14 lines 50-10 and Figures 3 and 4) The Examiner notes that the fine particle raw material can act as the active species, as well, because it too is subjected to the plasma source and the UV source.

Claim 8

Incorporating all arguments of Claims 1 and 6 and noting that Paz et al. teaches the active species is an ion of oxygen (112C) or nitrogen (112B). (See column 5 lines 21-30 and lines 45-56, columns 8-10 lines 39-63, columns 13-14 lines 50-10 and Figures 3 and 4)

Claims 9 and 10

Incorporating all arguments of Claims 1 and 6 and noting that Paz et al. teaches the active species is an ion or radical of inert argon gas (112A). (See column 5 lines 21-30 and lines 45-56, columns 8-10 lines 39-63, columns 13-14 lines 50-10 and Figures 3 and 4)

Claim 11

Incorporating all arguments of Claim 1 and noting that Paz et al. teaches the active species is fed to the substrate in an accelerated state (135 and 137). (See column 5 lines 21-30 and lines 45-56, columns 8-10 lines 39-63, columns 13-14 lines 50-10 and Figures 3 and 4)

Claim 15

Incorporating all arguments of Claim 1 and noting that Paz et al. teaches wherein the ceramic film is a dielectric. (See columns 15-18 lines 60-55)

Claims 16 and 17

Incorporating all arguments of Claims 1 and 15 and noting that Paz et al. teaches wherein the dielectric is formed at a temperature of 450 °C or less. (See column 14 lines 26-37 and the Abstract)

4. Claims 2 and 3 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP402179880 to Koketsu et al. in view of JP04035033 to Adachi et al. further in view of 6,146,905 to Chivukula et al.

Incorporating all arguments of Claim 1 and noting that Koketsu et al. and Adachi et al. fail to explicitly teach a diameter of fine particle that is 0.01 micrometer or less.

However, Chivukula et al., in column 6 lines 37-40, teaches depositing a ferroelectric dielectric with a grain size of 10 nm. Further, Chivukula et al. discloses that a superior high frequency response is noted in integrated circuits that are formed from reproducible small grain size ferroelectric layers.

It would have been obvious to one of ordinary skill in the art to modify Koketsu et al. and Adachi et al. by incorporating a ferroelectric grain size of 10 nm, as taught by Chivukula et al., to produce a superior high frequency response in ferroelectric films.

5. Claims 12 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP402179880 to Koketsu et al. in view of JP04035033 to Adachi et al. further in view of 6,120,846 to Hintermaier et al.

Incorporating all arguments of Claim 1 and noting that Koketsu et al. and Adachi et al. fail to explicitly teach a film-forming region on a substrate having an affinity for ceramics with a non-film-forming region having no affinity for ceramics.

However, Hintermaier et al., in columns 3-4 lines 30-44 and Figure 1, teaches a ferroelectric dielectric material that is selectively deposited on a bottom electrode (18) (having affinity to ceramics) and not deposited on the base member (11) (not having affinity to ceramics).

It would have been obvious to one of ordinary skill in the art to modify Koketsu et al. and Adachi et al. by incorporating a ferroelectric dielectric material that is selectively deposited on a bottom electrode and not deposited on the base member, as taught by Hintermaier et al., to allow for the fabrication, in one oxide deposition step, of ferroelectric and nonferroelectric capacitors.

Response to Arguments

6. Applicant's arguments with respect to claim 1 has been considered but is moot in view of the new ground(s) of rejection.

Conclusion

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David L. Hogans whose telephone number is (571) 272-1691. The examiner can normally be reached on M-F (7:30-4:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead Jr. can be reached on (571) 272-1702. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

DH DHA

CARL WHITEHEAD, JR.
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800